

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A PET detector comprising:
a ~~Lanthanum Halide~~ scintillator comprising a plurality of ~~Lanthanum Halide~~ crystals, said scintillator having a decay time constant $\tau \leq 35$ ns and a light output at least equal to the light output of NaI(Tl);
a ~~light guide~~; and
a plurality of photomultiplier tubes,
wherein said ~~Lanthanum Halide~~ scintillator ~~crystals~~, ~~said light guide~~ and said photomultiplier tubes are arranged respectively peripherally around a cavity for accepting a patient.
2. (Currently Amended) A PET scanner comprising:
a cavity for accepting a patient; and
a plurality of PET detector modules arranged ~~in an approximately cylindrical configuration~~ about said cavity, each PET detector including a ~~Lanthanum Halide~~ scintillator comprising a plurality of ~~Lanthanum Halide~~ crystals and said scintillator having a decay time constant $\tau \leq 35$ ns and a light output at least equal to the light output of NaI(Tl), a light guide, and a plurality of photomultiplier tubes, wherein said ~~Lanthanum Halide~~ scintillator ~~crystals~~, ~~said light guide~~ and said photomultiplier tubes are arranged respectively peripherally around said cavity.
3. (Currently Amended) A PET scanning system comprising:
a PET scanner comprising a cavity for accepting a patient and a plurality of PET detector modules arranged ~~in an approximately cylindrical configuration~~ about said cavity, each PET detector including a ~~Lanthanum Halide~~ scintillator comprising a plurality of ~~Lanthanum Halide~~ crystals and said scintillator having a decay time constant $\tau \leq 35$ ns and a light output at least equal to the light output of NaI(Tl), a light guide, and a plurality of photomultiplier tubes, wherein said ~~Lanthanum Halide~~ scintillator ~~crystals~~, ~~said light guide~~ and said photomultiplier tubes are arranged respectively peripherally around said cavity;

a time stamp circuit that records the time of receipt of gamma rays by respective PET detectors and provides timing data outputs; and

a processor that receives said timing data outputs, calculates time-of-flight (TOF) of gamma rays through a patient in the cavity, and uses said TOF of gamma rays in the reconstruction of images of the patient.

4. (New) A PET detector as in claim 1, wherein said scintillator comprises LaBr_3 .
5. (New) A PET detector as in claim 1, wherein said scintillator comprises LaCl_3 .
6. (New) A PET detector as in claim 1, wherein said scintillator crystals are about 30 mm thick.
7. (New) A PET detector as in claim 1, wherein said scintillator crystals have cross-sections of approximately 4 mm by 4mm.
8. (New) A PET detector as in claim 1, wherein said scintillator crystals are connected to said photomultiplier tubes through a light guide using optical coupling.
9. (New) A PET scanner as in claim 2, wherein said plurality of PET detector modules are arranged in an approximately cylindrical configuration about said cavity.